Remarks

Claims 2, 3 and 6 are cancelled and claims 1, 4, 5 and 7 are amended. Claim 13 is added. Claims 1, 4, 5 and 7 to 13 are pending in this application of which only claim 1 is in independent form.

Claims 3 to 9 were rejected under 35 USC 103(a) as being unpatentable over Blair et al as applied to claim 2 in view of legal precedent. Claim 1 is amended herein to incorporate all the features and limitations of claims 2, 3 and 6 and the following will show that claim 1, as so amended, patentably distinguishes the invention over Blair et al.

Before discussing Blair et al, applicants believe it will be helpful to first briefly review their invention.

The invention relates to an internal combustion engine having a resonance pipe through which exhaust gases flow. This is set forth in applicants' claim 1 with the clause:

> "at least one resonance pipe connected to said outlet and opening into said attenuating space via said inlet opening so as to cause said resonance pipe to be arranged in said flow direction between said outlet and said inlet opening for fluidly connecting said outlet to said inlet opening;"

From the above, it can be seen that the resonance pipe connects to the outlet of the engine for the exhaust gases and to an inlet opening in the attenuating space of the exhaust-gas muffler. The resonance pipe is disposed in flow direction between this outlet of the engine and the inlet opening of the

exhaust-gas muffler. Accordingly, the exhaust gases flow into the resonance pipe at the first end thereof arranged at the outlet of the engine and, at the opposite-lying end of the resonance pipe, the exhaust gases flow via the inlet opening from the resonance pipe into the attenuating space of the exhaust-gas muffler.

Blair et al discloses an internal combustion engine having an outlet at which a resonance pipe is arranged with a closed end 4. In column 1, lines 30 to 45, of Blair et al, this reference shows that through-flowed resonance pipes for internal combustion engines in handheld portable work apparatus are not suitable because of the large dimensions thereof (column 1, lines 47 to 51).

It has, however, been shown that for suitable selection of dimensions, a through-flowed resonance pipe can be used at the outlet of an internal combustion engine in a portable handheld work apparatus when, at the outlet of the resonance pipe (that is, at the inlet opening into the exhaust-gas muffler), a diaphragm is arranged. The diaphragm effects a reflection of pressure wave at the inlet opening. In this way and before the closing of the outlet from the cylinder of the engine, a partial backflow of the exhaust gas arrives in the cylinder. This prevents an outflow of fresh air/fuel mixture from the cylinder and thereby effects an improvement of the exhaust-gas values of the engine.

In order to obtain the wanted exhaust-gas improvement and at the same time, a low structural size of the resonance pipe, the diameter of the diaphragm and the diameter of the resonance pipe

must be matched to the piston displacement of the engine. For this purpose, the applicants' invention provides that the equivalent diameter of the diaphragm, which is measured in millimeters, amounts to approximately 1 to 3 times the square root of the volume of the piston displacement of the engine measured in cubic centimeters. The equivalent diameter of the resonance pipe (measured in millimeters) is approximately 2.5 to 6 times the square root of the volume of the piston displacement of the engine. With the configuration of the resonance pipe in this way, small dimensions and good exhaust-gas values are achieved. The arrangement of the exhaust-gas muffler and the end of the resonance pipe, which lies facing away from the outlet of the engine, furthermore provides the advantage that the exhaust-gas muffler need not be positioned directly at the outlet of the engine; instead, the exhaust-gas muffler is mounted at a distance therefrom. In this way, the space available for components in the work apparatus is better utilized.

An arrangement of the resonance pipe as set forth in applicants' claim 1, as now amended, is not obvious to a person exercising only ordinary skill. Blair et al only discloses a closed resonance pipe. A through-flowed resonance pipe is referred to in the state of the art but is not suitable for portable handheld work apparatus. There is no suggestion in Blair et al which could lead our person or ordinary skill to arrange a diaphragm at the inlet opening of the resonance pipe into the exhaust-gas muffler. Indeed, Blair et sl instead teaches to close off the second end of the resonance pipe in order to achieve a reduced structural size of the resonance pipe.

Accordingly, Blair et al can provide no hint as to how our person of ordinary skill may hit upon the idea of designing the diaphragm referred to the piston displacement of the engine in order to obtain a desired exhaust-gas improvement. Also, there is no hint in this reference for the design of the diameter of the resonance pipe referred to the piston displacement of the engine.

Applicants emphasize that the decisive size for the design of the diameter of the resonance pipe and the diameter of the diaphragm between the resonance pipe and the exhaust-gas muffler is the piston displacement of the engine and this is nowhere suggested in Blair et al.

In view of the above, applicants submit that claim 1, as amended, now patentably distinguishes the applicants' invention over Blair et al and should be allowable. The remaining claims are all dependent from claim 1 so that they too should be allowable.

Reconsideration of the application is earnestly solicited.

Respectfully submitted,

Walter Ottesen
Reg. No. 25,544

Walter Ottesen
Patent Attorney
P.O. Box 4026
Gaithersburg, Maryland 20885-4026

Phone: (301) 869-8950

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